

REMARKS

Applicants respectfully request reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow. A terminal disclaimer and an Information Disclosure Statement accompany this reply.

Status of Claims:

No claims are currently being cancelled. Claims 18-38 are currently being added. Claim 16 is currently being amended. Accordingly, claims 1-25 are submitted for reconsideration. A detailed listing of all claims that are, or were, in the application, irrespective of whether the claims remain under examination in the application, is presented, with an appropriate defined status identifier.

Claim Rejections – Double Patenting:

In the Office Action, claims 1-17 were rejected under the judicially created doctrine of obviousness type double patenting as being unpatentable over claims 1-17 of U.S. Patent No. 6,668,570. Due to the filing of a terminal disclaimer concurrently herewith, this double patenting rejection has been overcome.

Claim Rejections – § 112:

In the Office Action, claim 14 was rejected under 35 U.S.C. § 112, ¶ 2 as being indefinite. In particular, claim 14 was rejected because there is not reference for “said PWN.” By this Amendment, claim 14 has been amended to change “PWN” to “PWM,” which has antecedent basis in claim 13, from which claim 14 depends. Accordingly, Applicants request that this rejection be withdrawn.

Claim Rejections – Prior Art:

In the Office Action, claims 1-6, 8, 10-14, and 16 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Burward-Hoy (U.S. Patent No. 5,977,785) in view of Doyle et al. (U.S. Patent No. 3,757,530).

Claim 1 recites that an apparatus for controlling the temperature of an electronic device under test comprises a thermal head having a temperature controlled surface for making thermal contact with the electronic device, the thermal head defining a flow channel for passage of a refrigerant fluid so as to cause transfer of thermal energy between the electronic device and the thermal head. The apparatus further comprises a refrigeration system in fluid communication with the flow channel of the thermal head to supply refrigerant fluid thereto, the refrigeration system including a metering valve operative to regulate flow of the refrigerant fluid, the metering valve being located operatively adjacent the flow channel of the thermal head so as to regulate introduction of the refrigerant fluid into the thermal head. Finally, the apparatus comprises a controller operative to control the metering valve for maintaining a predetermined temperature at the temperature controlled surface.

Burward-Hoy discloses a heating and cooling apparatus 130 including a plate 140 that is heated and cooled by a heat exchanger 145, and during testing, a DUT 115 is coupled with good thermal contact to the plate 140 such that heat is transferred to and from the DUT 115 by the plate 140 through conduction (column 4, lines 7-13). The temperature of the DUT 115 is controlled by controlling the flow rates of a plurality of heat transfer liquids through the heat exchanger 145, each fluid having a different nominal temperature (column 4, lines 13-16). The heat transfer fluids of the heat exchanger are heated or cooled to their nominal temperatures away from the heat exchanger by equipment 155, which includes pumps for circulating the fluids through the heat exchanger 145 and a control circuit 156 that controls the rate of flow for each liquid.

Although not expressly stated in the rejection, it is implicit from the rejection that Burward-Hoy fails to disclose or suggest: a refrigeration system in fluid communication with the flow channel of the thermal head to supply refrigerant fluid thereto; a metering valve operative to regulate flow of the refrigerant fluid where the metering valve is located operatively adjacent the flow channel of the thermal head so as to regulate introduction of the refrigerant fluid into the thermal head; and a controller operative to control the metering valve for maintaining a predetermined temperature at the temperature controlled surface.

It is asserted, however, that Doyle cures these deficiencies of Burward-Hoy. Applicants respectfully disagree. First of all, the rejection does not identify any basis why one or ordinary skill in the art would have been motivated to modify Burward-Hoy based on the teachings of Doyle. Rather, the rejection merely states that it would have been obvious to make the modification to Burward-Hoy to include the refrigeration elements of Doyle "in order to provide the cooling of the electronic device in view of the teachings of Doyle." Since Burward-Hoy already discloses a system for cooling an electronic device under test, it is not understood what benefit is derived from another device providing the same function. Moreover, the rejection does not identify any teaching of Doyle that suggests such a motivation. There is also nothing in Doyle that discloses or suggests how its refrigeration system would be usable for a device under test. Accordingly, for all of these reasons, one of ordinary skill in the art would not have been motivated to modify the system of Burward-Hoy to include the refrigeration element of Doyle.

Even if combinable, Doyle fails to cure the deficiencies of Burward-Hoy. Doyle discloses a cooling system for a computer system having a variable flow expansion valve 10 for regulating refrigerant flow through the system as controlled by control signals generated by a sensing element 12, which responds to variations in temperature of the refrigerant passing into a return line 13 to the refrigeration unit (column 4, lines 3-14). The outlet of the expansion valve 10 is conveyed to a manifold distributor 14 connected to a group of parallel capillary tubes 16 (column 4, lines 18-20). Each capillary tube 16 is connected to a vertical column 18 of cold plates 19, which serve as evaporators and are designed for placement of a logic module thereon (column 4, lines 44-48). Doyle further discloses that not all of the refrigerant is evaporated in any of the column 19 such that there are variations in the columns in evaporation percentage (column 4, lines 58-62).

Like Burward-Hoy, Doyle fails to disclose or suggest a metering valve being located operatively adjacent the flow channel of the thermal head so as to regulate introduction of the refrigerant fluid into the thermal head, as recited in claim 1. As shown in Fig. 1, since the manifold 14 and capillary tubes 16, which Doyle identifies as four feet long, are interposed between the valve 10 and the plates 19, the valve 10 is not operatively adjacent to the plates 19.

Doyle also fails to disclose or suggest a controller operative to control the metering valve for maintaining a predetermined temperature at the temperature controlled surface, as recited in claim 1. In particular, there is nothing in Doyle that discloses or suggests that the control signals from the sensing element 12 are used to control the valve 10 to maintain the temperature of the plates 19 at a predetermined temperature. In fact, given that Doyle expressly recognizes that the refrigerant evaporation percentage varies in each column and that it is not necessary to balance the cooling paths, Doyle clearly fails to control the temperature of the plates 19 to a predetermined temperature.

The fact that Doyle is designed for a general cooling system for a computer and not for a cooling system for a device under test further supports the conclusion that Doyle does not control the metering valve to maintain a predetermined temperature at the temperature controlled surface. Rather, Doyle is merely designed to ensure that the logic modules of the computer system do not overheat, not that the plates 19 are maintained at a predetermined temperature. Accordingly, for all of these reasons, claim 1 is patentably distinguishable from the combination of Burward-Hoy and Doyle.

Claims 2-6 and 8 are also patentably distinguishable from the combination of Burward-Hoy and Doyle by virtue of their dependence from claim 1, as well as their additional recitations. For example, claim 3 recites that the metering valve is located at the first end of the capillary tube. As described above, Doyle discloses that the manifold 14 is located in between the valve 10 and the capillary tubes 16, and thus the valve 10 is necessarily not located at the first end of the capillary tube. Accordingly, claim 3 further distinguishes the claimed invention from the combination of Burward-Hoy and Doyle.

Claims 10-14 and 16 are patentably distinguishable from the combination of Burward-Hoy and Doyle for reasons analogous to claim 1.

Claims 7 and 15 were rejected under 103 as being unpatentable over Burward-Hoy in view of Doyle and further in view of Matsuoka et al. (U.S. Patent No. 4,807,445). Even if combinable, Matsuoka fails to disclose or suggest the deficiencies of Burward-Hoy and Doyle as described above. Accordingly, claims 7 and 15 are patentably distinguishable from the

combination of Burward-Hoy, Doyle and Matsuoka by virtue of their dependence from claims 1 and 10, respectively, as well as their additional recitations.

Regardless of the validity of the Official Notice taken with respect to claims 9 and 17, these claims are patentably distinguishable from the combination of Burward-Hoy and Doyle by virtue of their dependence from claims 1 and 10, respectively.

Finally, new claims 18-32 are patentably distinguishable from the cited references by virtue of their dependence from claims 1 and 10, as well as their additional recitations.

Conclusion:

Since all of the issues raised in the Office Action have been addressed in this Amendment and Reply, Applicants believe that the present application is now in condition for allowance, and an early indication of allowance is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicants hereby petition for such extension under 37 C.F.R. §1.136 and authorize payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

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By


George C. Beck
Attorney for Applicant
Registration No. 38,072

FOLEY & LARDNER LLP
Customer Number: 22428
Telephone: (202) 672-5300
Facsimile: (202) 672-5399